TOBACCO INDUSTRY RESEARCH COMMITTEE

CONFIDENTIAL

TIRC Grant #148 (Cf. #63)

Progress Report No. 4

February, 1960

David L. Simon, M.D.
Arnold Iglauer, M.D.
Cincinnati General Hospital

The Effects of Pipe Smoking and Cigar Smoking on the Cardiovascular System of Man

Much attention has been devoted to the effect of smoking cigarettes on the circulation but relatively little information is available on the circulatory action of pipe and cigar smoking. Such information seems important because of the large amounts of tobacco consumed in the United States in these forms. In 1955, it was estimated there were 8.8 million pipe smokers; the current annual consumption of pipe tobacco is nearly 75 million pounds. In 1955, there were 10.6 million cigar smokers; in 1959 almost 6.75 billion cigars were smoked. It is interesting that in two recent reports of mortality experience of nearly 400,000 men, although an increased death rate from carcinoma of the lung and heart disease was noted in heavy cigarette smokers, the death rate in regular cigar and/or pipe smokers was not appreciably higher than that of non-smokers. Therefore, it seemed worthwhile to gather data on the circulatory changes caused by smoking regular commercial and low nicotine cigars and pipe tobacco.

Method of Study

The subjects in this study were 25 habitual male smokers; their ages ranged between 21 and 69 years. Eight subjects were studied while sham smoking unlit pipes or cigars under identical conditions. Studies were carried out in the basal post-absorptive state. Skin temperature changes were measured in each subject on different days while smoking regular commercial or low nicotine tobacco. On a third day the effect on the ballistocardiogram of smoking regular commercial tobacco was determined; the order of these studies was variable. Skin temperatures were measured in a constant temperature room at 78° F. (25.6 C.) and 40% relative humidity from copper-constantan thermocouples attached to the forehead and the volar surfaces of the fingers and toes. Blood pressure and pulse rates were obtained by the usual clinical method. The ballistocardiograms were recorded with a high frequency table type research instrument. The subjects were supine and unclothed and rested for at least 45 minutes prior to smoking. The period of smoking was 20 minutes. The commercial cigars were Carcia y Vega Roosevelts, containing 1.82% nicotine. The low nicotine cigars were Sano, containing 0.88% nicotine. The pipe tobacco used was Half-and-Half, containing 2.15% nicotine. Sano pipe tobacco containing 0.72% nicotine was used for the low nicotine studies.

The cigars weighed approximately 6.5 gms. A pipeful of tobacco weighs approximately 2.0 gms. For comparison, a standard cigarette contains 1 gm. of tobacco and approximately 2% nicotine.

1003541189

Source: https://www.industrydocuments.ucsf.edu/docs/lml0000

Results

Ballistocardiogram:

Cigars: Studies were made while smoking regular commercial cigars in 12 subjects. In 9 of the 12 subjects, ballistocardiograms were normal before smoking. Three of these remained normal throughout the smoking period and after smoking. Three showed increased respiratory variation. Three, however, showed greater changes from normal, either in the form of early M or late downstroke patterns.

SLIDE I - The records of the other 3 subjects were abnormal before smoking. In two of these, the abnormality increased during and after smoking, and in one it lessened. The maximum changes occurred within 10 to 20 minutes of the start of smoking and persisted for 20 to 30 minutes or longer.

Pipes: Ten subjects were studied while smoking regular commercial tobacco. The ballistocardiograms of 8 were normal before smoking. Three of these remained normal throughout; three showed only minor changes, consisting either of minor respiratory variation or changes in the amplitude of the complexes. Two showed rather marked abnormality after smoking, with development of a definite early M pattern.

SLIDE II - In 2 subjects who smoked pipes, the records were abnormal before smoking. In one of these, the record showed only minimal changes during smoking but in the other the abnormalities became much more marked. The changes occurred in from 10 to 20 minutes and persisted for 20 or 30 minutes or longer.

SLIDE III -Pulse Rate:

SLIDE IV - Blood Pressure:

SLIDES V, VI, VII -

Skin Temperatures:

The average initial skin temperature of the fingers was 32.3° C. Skin temperature in forehead did not change. Changes in toe temperatures were variable and inconsistent.

1003541190

Discussion

Ballistocardiogram:

Previous observers have found changes in only a small proportion of healthy young males during cigarette smoking. We found deterioration of the ballistocardiogram in 23 of 24 subjects who chewed tobacco. Abnormalities of the ballistocardiogram occurred or increased in 8 of 12 subjects after smoking cigars and in 6 of 10 subjects after smoking pipes.

Source: https://www.industrydocuments.ucsf.edu/docs/jpl0000

In contrast to studies of cigarette smokers, none of these subjects inhaled. Previous studies are not in agreement as to the percentage of nicotine absorbed by smokers who do not inhale. The most frequently cited work, that of Baumberger in 1923 indicates a high percentage of nicotine absorption, even without inhaling (66-77%). A more recent study by Greenberg and others indicated that without inhaling a smaller percentage of nicotine content of smoke is retained in the body. They found 4 to 45% of the nicotine was retained in smokers who did not inhale, whereas 96-98% was absorbed in subjects who inhaled. This raises the question of the effect of the respiratory activity alone during smoking - on the circulation.

Mulinos and Shulman found that deep breathing could produce transient vaso-constriction in the hands. However, none of our pipe or cigar smokers inhaled or breathed deeply. Many previous observers: Roth, Maddock and Coller, Wright and Moffatt, Weatherby - have shown that sham smoking produced negligible changes in skin temperatures, pulse rates and blood pressures. More recent studies by Freund were confirmatory. Furthermore, Weatherby found quite inconsistent, small and variable changes in actual respiration during the act of smoking. In our own studies of sham smoking, no changes were found even in subjects who showed changes while smoking.

Thus, the present study indicates that failure to inhale does not prevent appearance of the usual circulatory effects of nicotine. Very few previous studies of pipe and cigar smoking were found. Maddock and Coller, in a few subjects, found - following pipe smoking - that pulse, blood pressure and skin temperature changes were similar to cigarette smokers. According to Scott, nicotine levels in the blood were lower after cigar or pipe smoking than after cigarette smoking.

It should be pointed out that the amount of nicotine available for absorption varies with such factors as moisture content, combustion temperature, length of filtration, loss through expectoration, as well as the obvious factors of nicotine content of tobacco smoked and rate of smoking.

Summary and Conclusions

The usual effects of tobacco smoking on the circulation were found following smoking of both regular and low nicotine tobacco in cigars and pipes; that is, pulse and blood pressure increased and skin temperature fell in the fingers. Changes were not as marked as usually found following cigarette smoking or chewing tobacco.

The incidence of changes in the ballistocardiograms in this study was less than that found following chewing tobacco, but greater than that found following cigarette smoking.

The circulatory effects of cigar and pipe smoking were approximately the same.

1003541191

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

Summary and Conclusions (cont'd)

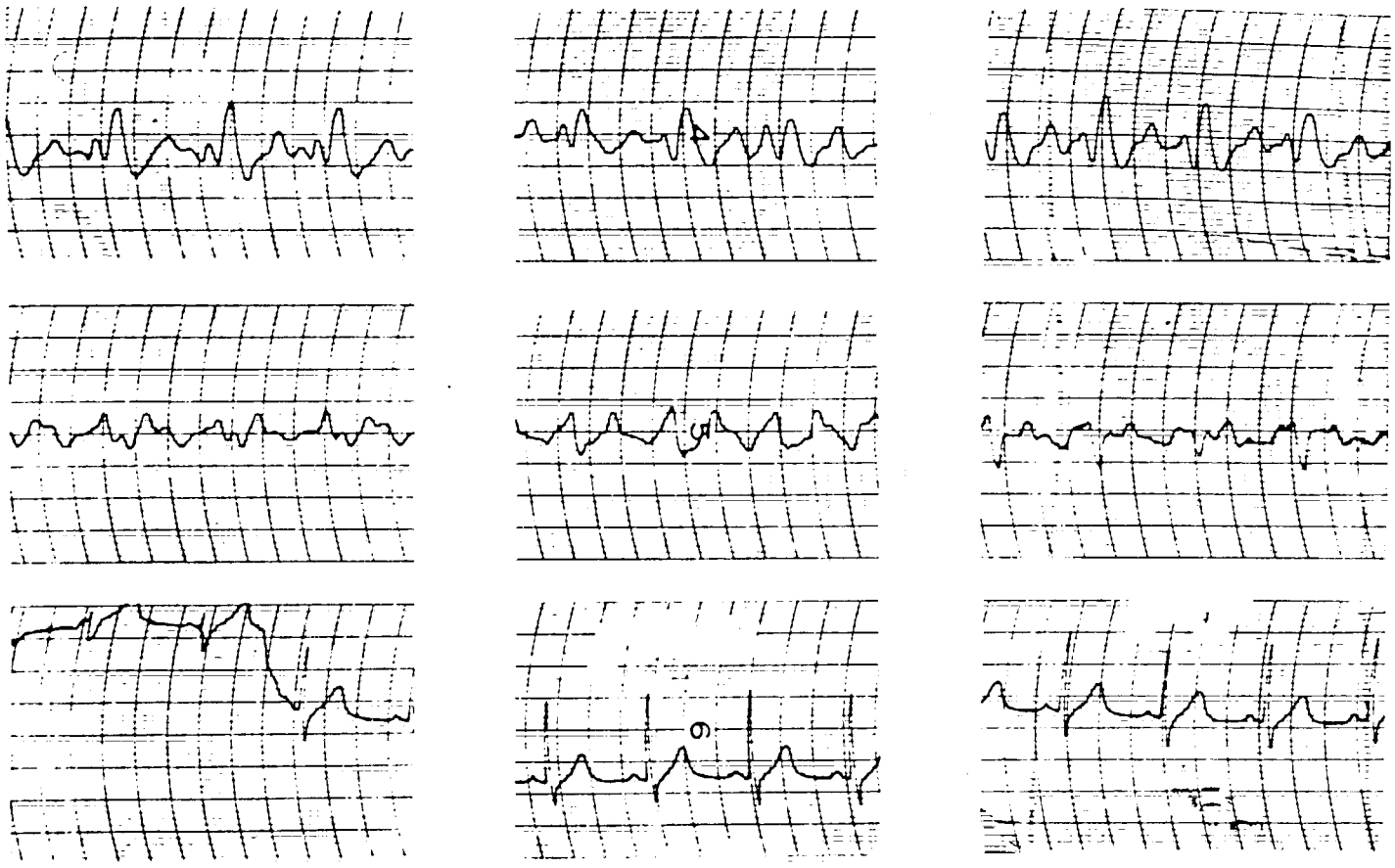
Circulatory changes were slightly less following low nicotine cigars and pipes when compared to standard cigars and pipes.

In describing the slides - comparisons were made in slides 3, 4 and 7 of cigar and pipe smoking and cigarettes and chewing tobacco.

Slides 5 and 6 were like the others but don't have corrected prints, so enclose them anyway.

1003541192

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000



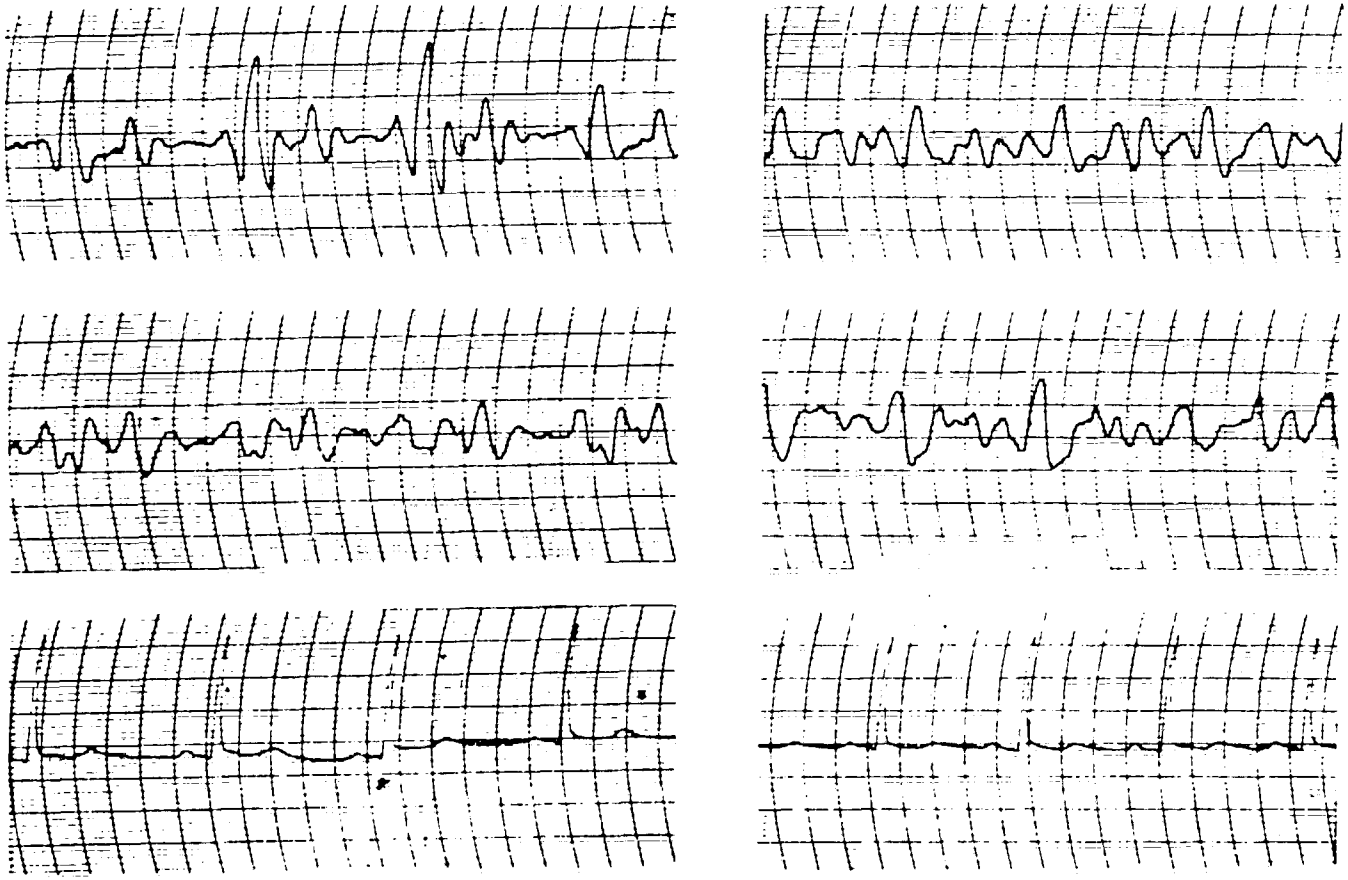
Control 11 Minutes 44 Minutes

BALLISTOCARDIOGRAMS CIGAR SMOKING

1003541193

slide 5

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000



Control

21 Minutes

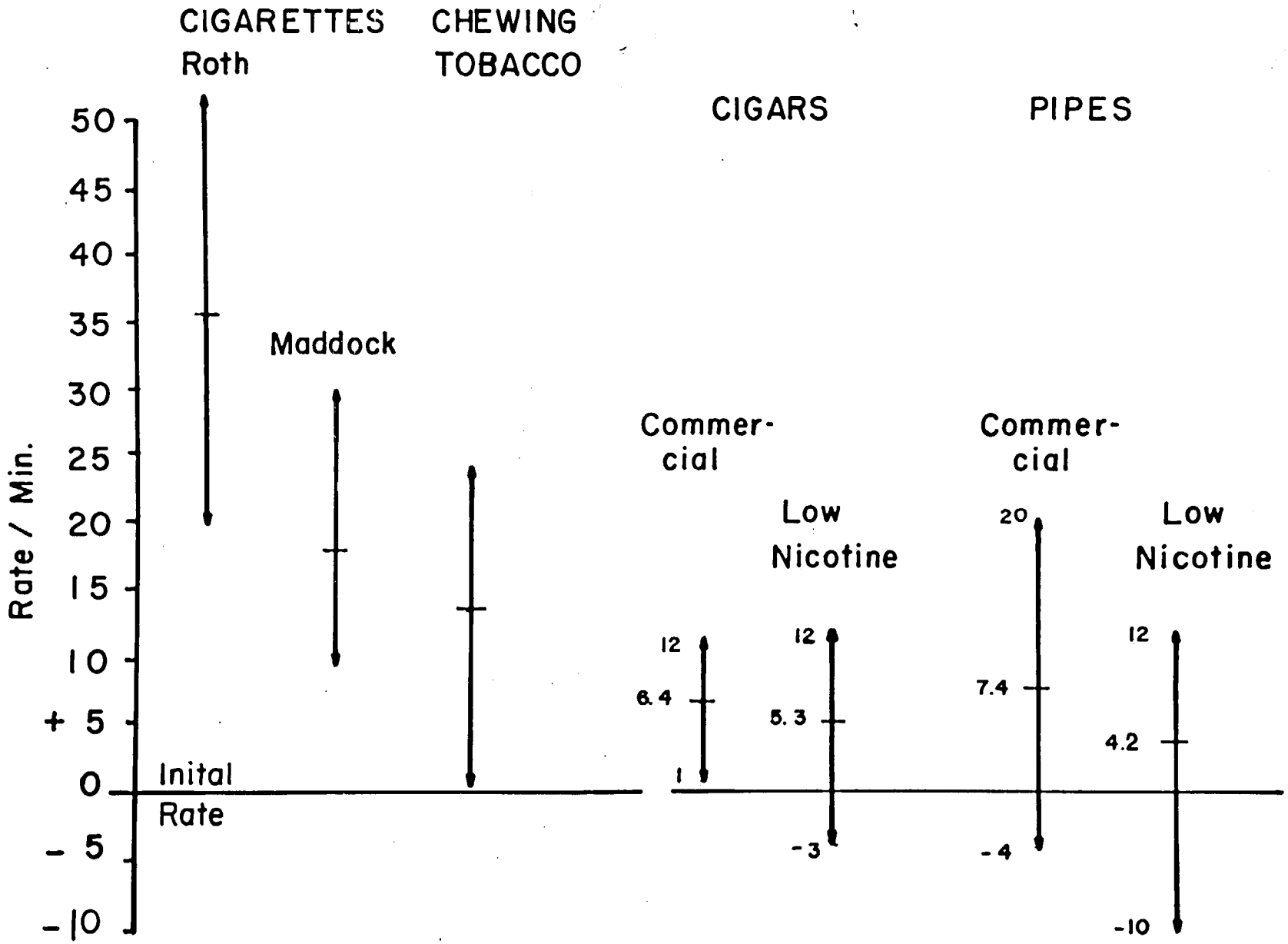
BALLISTOCARDIOGRAMS PIPE SMOKING

1003541194

slide 2

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

CHANGES IN PULSE RATE

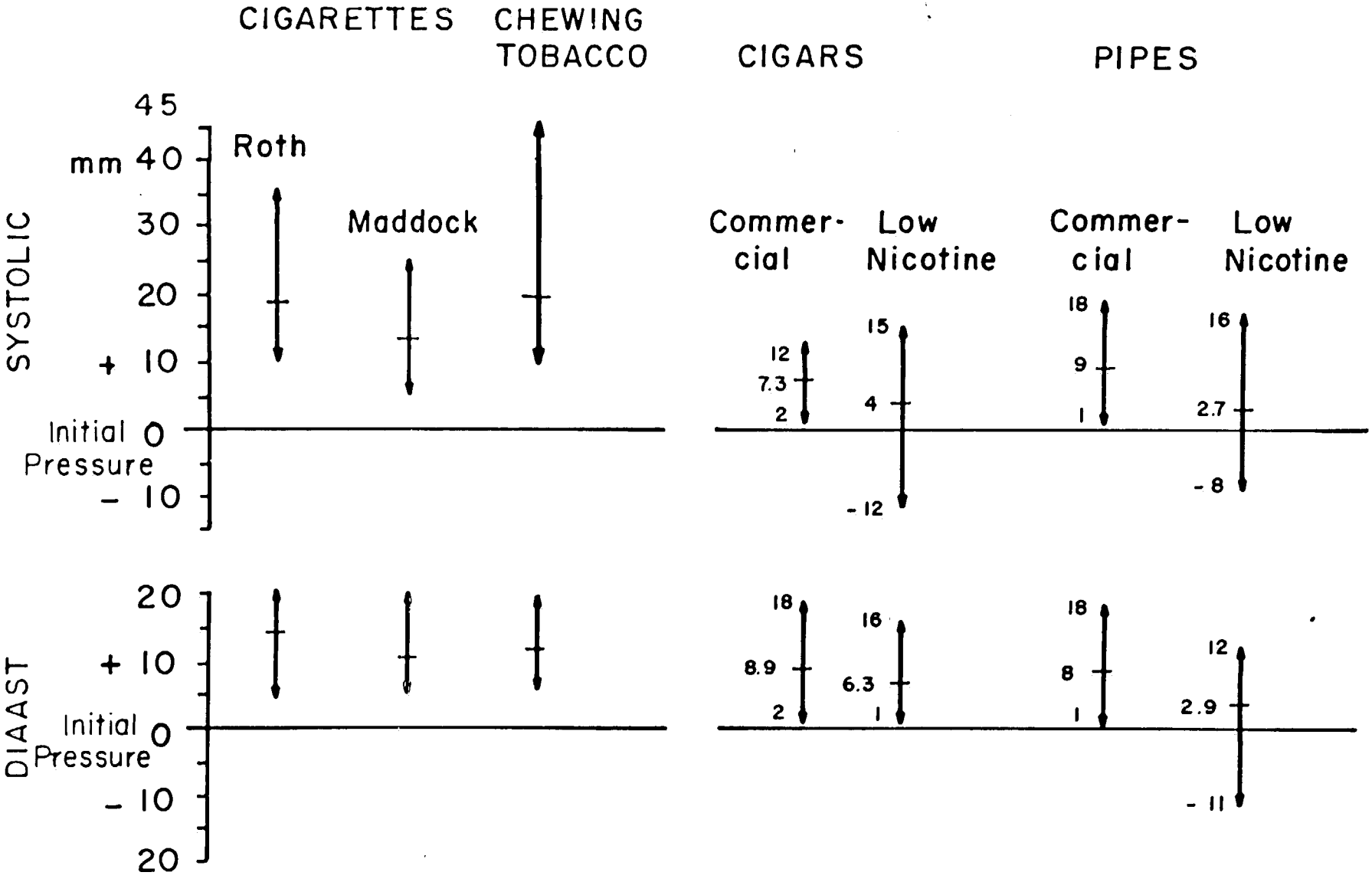


1003541195

Slide II

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

CHANGES IN BLOOD PRESSURE



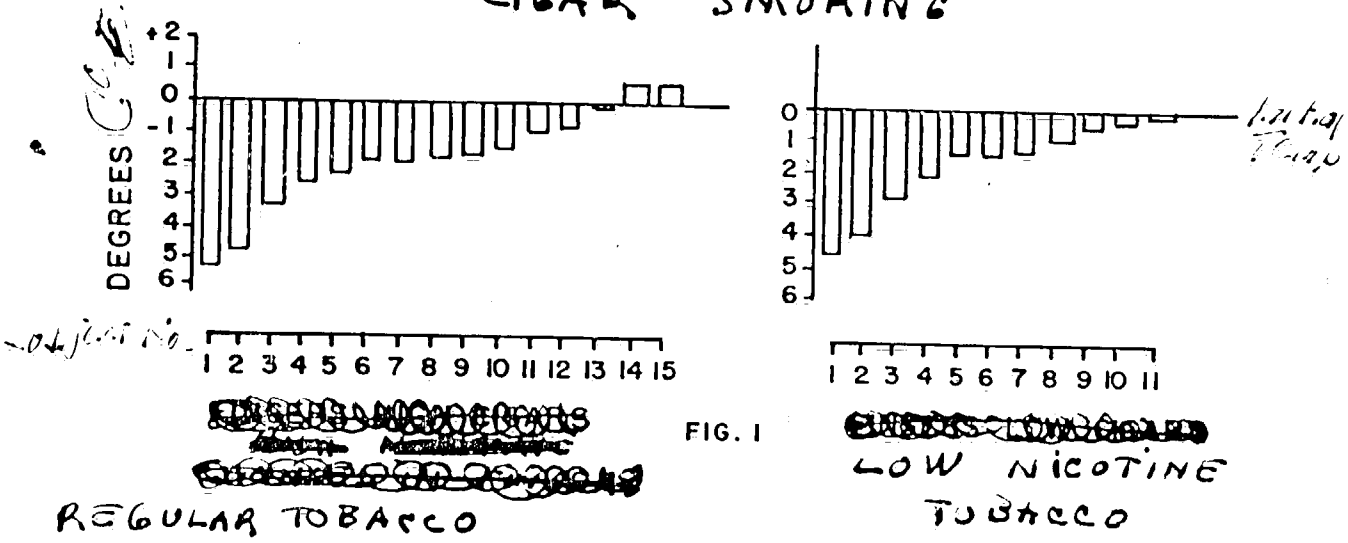
100354196

slide 12.

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

AVERAGE CHANGES IN FINGER TEMPERATURE
CIGAR SMOKING



REGULAR TOBACCO

LOW NICOTINE TOBACCO

FIG. 1

1003541197

Source: https://www.industrydocuments.ucsf.edu/docs/ltpl0000

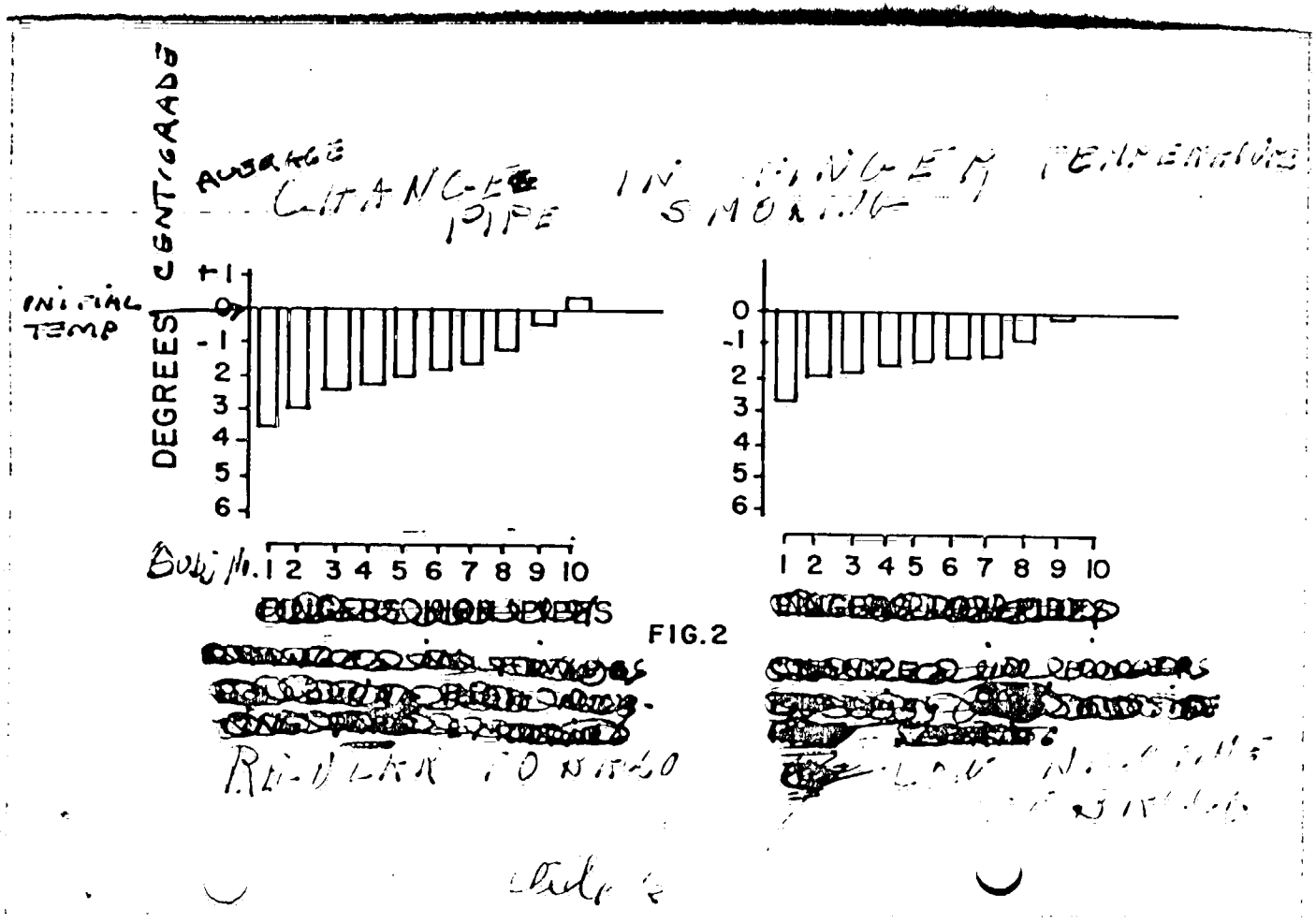
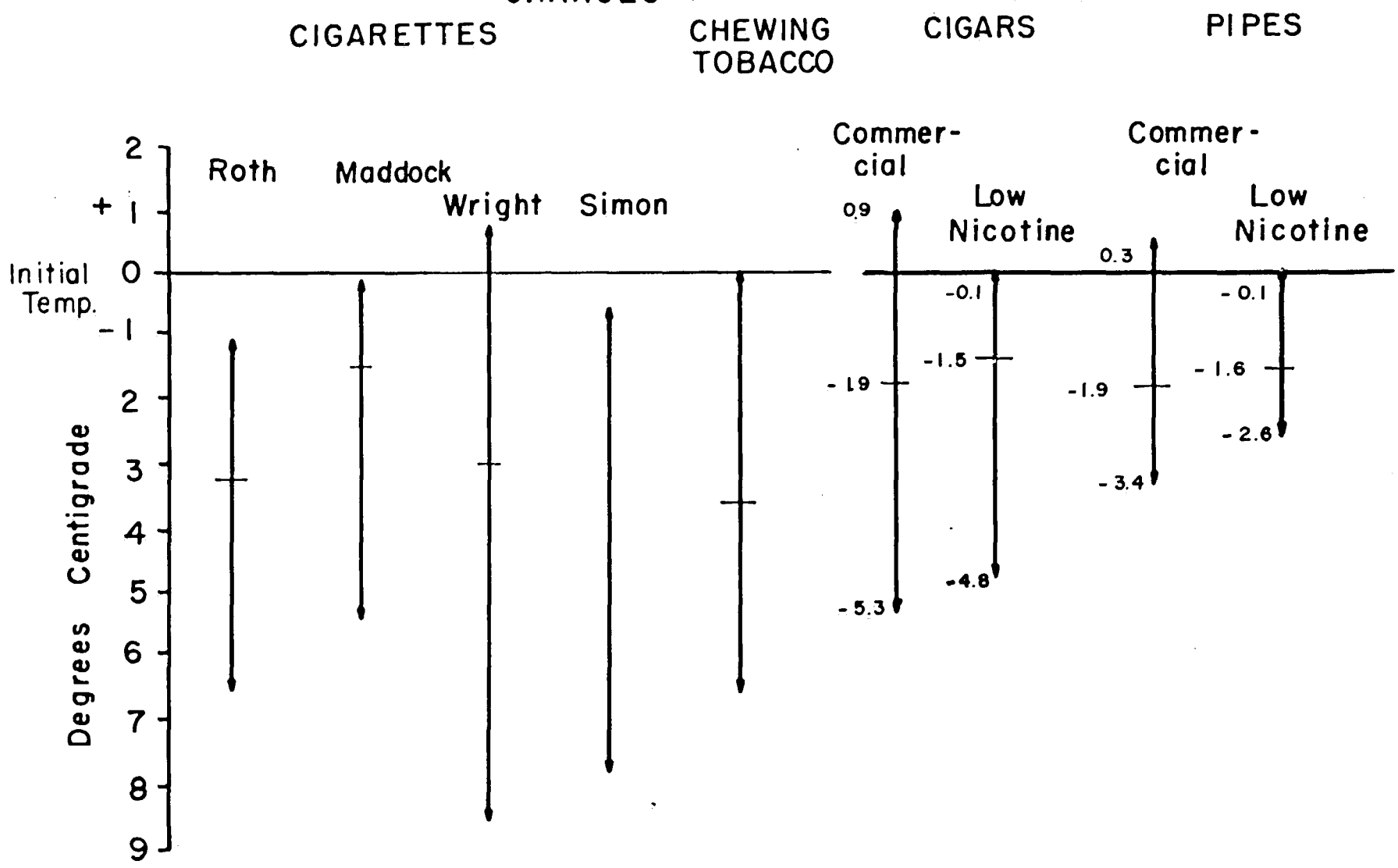


FIG.2

10035411198

CHANGES IN FINGER TEMPERATURES



1003541199

slide 2